



TECHNICAL FIELD

The following description relates to a facsimile service. More particularly, the following description relates to using an embedded web server in a printer to provide facsimile services in addition to printer services.

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BACKGROUND

There is a strong trend toward convergence of functionality in the printing, copying, scanning, and facsimile industries. This is evidenced by the availability of various types of multi-function devices that provide two or more of copying, printing, scanning, or facsimile functionalities. However, multi-function devices are not as prolific in home or business environments as are traditional single-function devices such as single-function facsimile machines and printers.

Commonly, someone having only a single-function device such as a networked printer desires to receive a facsimile when he/she does not have convenient access to a facsimile device. This problem is typically resolved in one of a number of different ways. For example, a party desiring to receive a facsimile can have it sent to a third-party facsimile service provider. However, receiving facsimiles at such a third-party provider is typically inconvenient because the facsimile must, in some manner, be picked-up from the third-party or delivered to the intended recipient. Moreover, receiving facsimiles at such a third-party provider is often not an option for any one of number of reasons such as confidentiality concerns.

Another way to solve the described problem is to obtain another device such as another single-function device or a multi-function device that is configured to receive and print facsimiles. Separate printer and facsimile devices

typically require more space, or “real-estate” to store than does a single multi-function device that provides both printing and facsimile services. However, multi-function devices are generally more expensive to purchase and/or maintain as compared to the cost and/or maintenance of respective single-function devices.

5 Ideally, someone having only a single-function printer device who desires to receive a facsimile transmission would not be required to: (a) receive facsimiles at a third-party facsimile service provider; or, (b) obtain another device, regardless of whether the other device is a single-function device or a multi-function device, to receive the facsimile. In this manner, a single-function printer would become
10 more valuable and more useful in a home or business environment.

 Accordingly, the various embodiments of the subject matter described below arose out of concerns associated with the above described scenario where someone with a single-function network printer device desires to receive a facsimile when they do not have convenient access to a facsimile device.

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SUMMARY

 The described system and procedure provides facsimile delivery to a user that only has access to a single-function networked printer device. To accomplish this, the system receives a facsimile sent to a telephone number. Responsive to
20 receiving the facsimile, the facsimile is converted from a facsimile data format to a printable data format that is compatible with a printer device. Next, the converted facsimile is wrapped in a network transfer protocol language such as Hypertext Transfer Protocol to form a Web Page.

 Next, a Universal Resource Locator (URL) is identified that corresponds to
25 the telephone number used to send the facsimile to the system. The URL

identifies an embedded web server in a printer. Next, the Web page comprising the converted facsimile is communicated to the identified embedded web server for printing by the printer. In this manner, the described system and procedure provides a facsimile delivery service to a user that does not have convenient
5 access to a traditional facsimile device, but rather only has access to a single-function networked printer device.

BRIEF DESCRIPTION OF THE DRAWINGS

The same numbers are used throughout the drawings to reference like
10 features and components.

Fig. 1 is a block diagram of exemplary components of a facsimile services system to receive and print facsimiles at a networked printer.

Fig. 2 is a flowchart diagram of an exemplary procedure for an embedded web server in a networked printer to receive and print facsimiles.

15 Fig. 3 is a block diagram that illustrates aspects of an alternative system to receive and print facsimiles at a networked printer.

DETAILED DESCRIPTION

The following description sets forth a specific embodiment of a system and
20 procedure that incorporates elements recited in the appended claims. The embodiment is described with specificity in order to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different elements or combinations of

elements similar to the ones described in this document, in conjunction with other present or future technologies.

Exemplary System

5 Fig. 1 is a block diagram of an exemplary facsimile services system 100 to receive and print facsimiles, or “faxes”. System 100 provides convenient "fax to me" capabilities to users having only a networked printer without requiring a user to purchase a separate facsimile machine to receive a fax, and without requiring the user to receive facsimiles at a third-party facsimile service provider.

10 Moreover, because system 100 obviates the need for a user to have access to a separate fax machine to receive faxes, system 100 reduces that amount of space that would otherwise be needed to use and store a separate fax capable device. In this manner, the described system makes a single-function printer more valuable and more useful in a home or business environment.

15 System 100 includes a facsimile service 102 coupled to a telephone network 106 such as a public telephone network. The facsimile service comprises a service provider 110 such as a Point of Presence (POP) service provider. The service provider is operatively coupled to a network of computers such as the Internet 112. The Internet is operatively coupled to one or more networked

20 printers 114. Each network printer comprises an embedded web server 116. The embedded web server (“EWS”) communicates with the service provider using a network transfer protocol such as the Hypertext Transfer Protocol (HTTP) to receive and serve web page documents.

 A facsimile, or “fax” 104 is a document that comprises text and/or

25 graphics. The fax is transmitted from a fax machine (not shown) through the

telephone network 106 to the service provider 110. The fax machine can be any type of device such as a conventional fax machine or a personal computer ("PC").

To transmit the document, the fax machine converts the contents of the document into a facsimile transmission format, and using a predetermined phone number, transmits the converted document over the telephone network 106 to the service provider 110. Facsimile transmission formats are well-known to those skilled in the art of computer programming facsimile products. Where a PC is employed as a fax machine, the PC is provided with a facsimile compatible modem and translation software for converting contents of a document to a facsimile transmission format.

In one embodiment, the predetermined phone number used to transmit the fax to a service provider 110 is assigned by the service provider to an entity when the entity subscribes to a "fax receive via EWS" service. Such a service provides fax delivery to the entity if the entity has an EWS equipped printer 116, independent of whether the printer can parse a facsimile transmission data format. The entity is free to distribute the assigned telephone number to those who wish to send a fax to the entity.

A unique Universal Resource Locator (URL) is assigned by a network administrator to the entity's EWS network printer 116. The assigned URL is mapped at the service provider to the provided telephone number.

In this implementation, the URL/telephone number mapping is stored in mapping table 118. Mapping table 118 comprises one or more predetermined telephone numbers, wherein each telephone number corresponds to a unique URL that is assigned to a particular EWS enabled printer 114. The mapping table is

stored on a database (not shown) or any other type or combination of non-volatile or volatile data storage that is operatively coupled to the service provider 110.

Responsive to receipt of the facsimile 104, the service provider 110 identifies the unique URL that was mapped to the telephone number used to transmit the facsimile 104 to the service provider. This can be accomplished using mapping table 118. As noted above, the identified URL corresponds to a particular EWS 116 in a printer 114. Next, the service provider 110 converts the received facsimile 104 from a facsimile transmission format into a specific printer format that corresponds to the particular printer. Printer formats include, for example, Portable Document Format (PDF), Graphics Interchange Format (GIF), Joint Photographic Experts Group (JPG) format, American Standard Code for Information Interchange (ASCII) format, and Printer Control Language (PCL) format.

A service provider determines a specific printer format to use in the facsimile format to printer format conversion procedure in a number of different ways. In one implementation, the service provider sends a message to the identified URL to determine the particular printer format that the printer 114 requires or prefers. Such a message can be sent using a network transfer protocol such as HTTP. In yet another embodiment, the service provider determines required or preferred printer data formats when an entity signs up with the service provider for a service such as a "fax-receive via EWS" service. Such printer data formats are stored in mapping table 118 in a manner that identifies such printer data formats on a printer-by-printer basis.

Next, the service provider wraps the converted fax data in a network transfer protocol such as HTTP so that the converted fax data can be sent as a

Web page to the EWS 116 in the printer 114. In one embodiment, the Web page containing the converted fax data includes header information that identifies the Web page as a "fax job". Responsive to parsing such header information, a recipient such as the printer 114 is able to differentiate a Web page that includes a fax from any other type of Web page.

Next, the service provider 110 communicates the Web page containing the converted fax data over the Internet 112 to the address of the identified URL. In this manner the converted fax is transmitted to the appropriate EWS 116 in the corresponding EWS enabled printer. The EWS 116 receives the incoming "fax job", which looks like a print job because the fax has already been converted from the facsimile transmission format as discussed above, to a printer compatible data format. The EWS extracts the converted fax data from the received Web page and communicates the extracted fax data to the printer 114, which in turn prints the converted fax out.

In one implementation, responsive to receiving the fax job, the EWS 116 sends a status message to the service provider 110. Such a status message includes information that corresponds to the fax job such as a successful print indication, a failed print indication, a printer toner out indication, or a paper jam indication. The status message can be sent back to the service provider in a number of different ways such as through the Internet as a Web page, or as an electronic mail ("e-mail") message. Where the status message is a successful print indication, the message indicates a "guaranteed fax delivery" service to the message recipient.

In one implementation, responsive to receiving the status message from the EWS 116, the service provider 110 communicates a notification that corresponds

to the status message to any one of a number of entities. Such entities include, for example, the sending fax machine (via typical fax protocols), the printer 114, an e-mail address, a pager number, a Personal Digital Assistant (PDA), or to a mobile phone number.

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Exemplary Procedure

Fig. 2 is a flowchart diagram of an exemplary procedure 200 for an embedded web server in a networked printer to receive and print facsimiles. Step 202 receives a facsimile sent to a telephone number. Step 204, responsive to receiving the facsimile (step 202), converts the facsimile from a fax data format to a printable data format. Step 206 wraps the converted facsimile in a network transfer protocol language to send the converted facsimile to an embedded web server enabled printer as a Web page. Step 208 identifies a Universal Resource Locator (URL) that corresponds to the telephone number, the URL identifies the embedded web server in the printer. Step 210 communicates the wrapped facsimile, or "Web page" to the embedded web server for printing by the printer. Step 212 receives the wrapped facsimile. Step 214 extracts the converted facsimile data from the wrapped facsimile. Step 216 prints the extracted facsimile data.

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Alternative Embodiment

Fig. 3 is a block diagram that illustrates aspects of an exemplary alternative system 300 to receive and print facsimiles 104 at a networked printer 114. Service provider 110 of Fig. 1 is provided at or near an EWS enabled printer 114. In this implementation, service provider 110 is a device such as a modem or Line

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Interface Unit (LIU), which is operatively coupled between a telephone line input jack 302, a telephone 304, and the EWS enabled printer. The device can be a dedicated standalone device, a device implemented in a print server such as a JetDirect ® print server manufactured by Hewlett Packard Corporation, the EWS
5 enabled printer itself, or the like.

The device 110 is programmed by a user with the printer's assigned URL. There are a number of different ways that such a device can be programmed with the printer's assigned URL. For example, a serial cable (not shown) coupled to a computer (not shown) can be coupled to a serial port (not shown) on the device
10 110. The URL data is downloaded from the computer to the device. In yet another example, a user programs the device with URL data by setting one or more jumpers (not shown) on the device.

Responsive to receiving a facsimile transmission 104, a device 110 identifies the transmission as a facsimile transmission. Procedures for
15 determining whether a received set of data corresponds to a facsimile transmission or a voice communications transmission are known in the art of telecommunications. Rather than routing the identified facsimile transmission to the telephone 304, the device performs the facsimile format to printer format conversion procedures, as well as the converted/wrapped facsimile transmission to
20 the EWS enabled printer 114, which are described in greater detail above with respect to Figs. 1-2.

Conclusion

Traditional procedures typically require an entity who only has access to a
25 single-function networked printer device, either to obtain another device to

receive a facsimile, or to receive the facsimile at a third-party facsimile service provider. Moreover, traditional fax machines typically require a dedicated telephone line in the home or business environment that is coupled to a fax machine to receive facsimiles.

5 In contrast to such traditional systems and procedures, the described systems and procedures of Figs. 1-3 provide fax delivery to a user that only has convenient access to a single-function networked printer device. Moreover, aspects of the described subject matter provide such fax delivery services to the user without requiring the user to have a separate dedicated telephone line in a
10 home or business environment to receive fax delivery. Thus, the described subject matter makes a single-function printer more valuable and useful in a home or business environment as compared to traditional single-function printers.

Although details of specific implementations and embodiments are described above, such details are intended to satisfy statutory disclosure
15 obligations rather than to limit the scope of the following claims. Thus, the subject matter as defined by the claims is not limited to the specific features described above. Rather, the subject matter is claimed in any of its forms or modifications that fall within the proper scope of the appended claims, appropriately interpreted in accordance with the doctrine of equivalents.

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